

**Progress Report  
Performance Period: July – September, 2007**

**Submitted to  
State Water Resources Control Board  
Central Valley Regional Water Quality Control Board  
for Agreement No. 05-416-150-0  
("Central Valley Salinity Data Study" component)**

**October 16, 2007**

**by  
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**Amendment of Work Plan**

A draft amendment for the project by Central Valley RWQCB was received in September, 2007. According to the draft amendment, we are redirected to collect only metadata on available water quality data sources and databases that are related to the salinity issue, but not to create an internet accessible database with the actual data as originally described in the work plan submitted in January of 2007. Therefore, our plan has been modified accordingly with objectives as follows:

- Identify and locate existing data sources and identify types of data and quality of information available.
- Determine ownership and accessibility of data.
- Collect and summarize metadata, including areas of coverage, types of water, quality of data, physical and chemical parameters, including volume and flow, etc.
- Develop graphics and maps based on metadata to visualize data distribution in space and time.
- Identify data gaps, if possible, and make recommendations to aid future data collection plans.
- Identify and recommend modeling tools (modeling approaches, codes, and software) to support salinity management decisions.

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Current Efforts

The internet server setup has been discontinued. Database building using Microsoft Access has stopped. Nevertheless, we continue to summarize metadata based on Microsoft Excel spreadsheet and graphics utilities. Maps generated by this project will conform to ARC GIS format for compatibility and easy transfer.

In the first half of the year, we have concentrated on groundwater data sources. Since last quarter, we have started identifying surface water data and waste water data sources with special focus on salinity (TDS). In particular, we have also looked into flow information that are required for mass transfer calculations and management models. A brief summary of the work is included in the Appendix of this report.

Budget and Personnel

We have submitted a revised budget according to the project amendments. To ensure continuity without undue delays, we plan to continue with our staff without any making any unnecessary changes in personnel. The current project personnel include: Professor John Suen (project director – hydrogeologist), Dr. X. Yang (research assistant – data specialist), Rose Marrero (graduate lab assistant), and K. Vang (program specialist – computer).

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## **APPENDIX 1**

### **Updated data source summary tables**

Agency	Environmental Protection Agency	Environmental Protection Agency	US Geological Survey	US Geological Survey	USGS/State Water Boards	Interagency Ecological Program	State Water Resources Control Board	US Bureau of Reclamation
Database	STORET (LDC)	STORET (Modernized)	NWIS	NAWQA	GAMA (Database in progress)	IEP	SWAMP	USBR
Contact Person	Eric Wilson	Eric Wilson	MICHAEL V. SHULTERS (California Water Science Center, Director)	Sandy (Alex) K. Williamson (Database Team Leader) Nate Booth (Database developer) Donna N. Myers (Program Chief) Charles R. Kratzer (San Joaquin Basin) Kenneth Belitz (Santa Ana Basin)	Kelly McPherson (Geographer) or GAMA Project Chief	Anke Mueller-Solger (Staff Environmental Scientist)	Valerie Connor (Program Coordinator) Karl Jacobs (BDAT Senior Project Manager) DWR	Brian Person (Northern CA Area Office) Michael R. Finnegan (Central CA Area Office) Michael Jackson (South Central CA Area Office)
Contact number	(415) 972-3454	(415) 972-3454	(916) 278-3000 1-888-275-8747	Donna N. Myers (703) 648-5716 Jennifer Shelton (916) 278-3068	Kelly McPherson (916) 278-3169 GAMA Project Chief (619) 222-2243	(916) 651-9547	(916) 341-5573	Brian Person: (530) 275-1554 Michael R. Finnegan: (916) 988-1707 Michael Jackson: (559) 487-5116
E-mail	wilson.eric@epa.gov	wilson.eric@epa.gov	Web feedback page	akwill@usgs.gov nlbooth@usgs.gov dnmyers@usgs.gov ckratzer@usgs.gov kbelitz@usgs.gov jshelton@usgs.gov	krmcpher@usgs.gov	For dayflow data: cenright@water.ca.gov	vconnor@waterboards.ca.gov kjacobs@water.ca.gov	Brian Person: sharral@mp.usbr.gov Michael Finnegan: MFINNEGAN@mp.usbr.gov
Surface water	Water-quality data (physical and chemical parameters) for streams, reservoirs, lakes and canals.	Water-quality data (physical and chemical parameters) for streams, reservoirs, lakes and canals.	Stream flow, current hydrologic conditions, peak-flow data and water quality	Daily stream discharge, physical conditions and chemical parameters	N/A	Physical conditions, discrete water-quality data	Water-quality data (physical and chemical parameters) toxicity	Daily, annual, and monthly precipitation. Stream flow. Snow-pack formation. Water supply to irrigated areas.
Ground water	Water-quality data (physical and chemical parameters)	Water-quality data (physical and chemical parameters)	ground-water levels and water-quality data	Water-quality data (physical and chemical parameters)	Chemical constituents, hydrogeologic provinces in GIS based upon CA ground-water basins	N/A	N/A	N/A
Drinking water	Chemical parameters in public water-supply systems.	Chemical parameters in public water-supply systems.	N/A	N/A	N/A	N/A	N/A	N/A
Waste water	measurement of waste-water indicators	measurement of waste-water indicators	N/A	N/A	N/A	N/A	N/A	N/A
Water import/export	N/A	N/A	Daily Stream flow and discharge	stream flow	N/A	Water exports to the Bay Delta.	N/A	Water capacity in CA dams Outflow of water for irrigation and personal use. Monthly and annual water deliveries, diversions and stream flow.
Salinity	conductance, nutrients (e.g., phosphate, nitrate)	conductance, nutrients (e.g., phosphate, nitrate)	conductance, nutrients (e.g., phosphate, nitrate) and stream flow	Stream flow, conductance, nutrients (e.g., phosphate, nitrate)	TDS content at sampled sites	TDS content at sampled sites and surface water export	TDS content at sampled sites	Outflow data from CA dams. Water deliveries, diversions and stream flow
Geological setting	N/A	N/A	Basic site description and location	Topographic maps. Site, well, and basin information. Land use, soil, and population density.		N/A	N/A	N/A

Agency	Environmental Protection Agency	Environmental Protection Agency	US Geological Survey	US Geological Survey	USGS/State Water Boards	Interagency Ecological Program	State Water Resources Control Board	US Bureau of Reclamation
Database	STORET (LDC)	STORET (Modernized)	NWIS	NAWQA	GAMA (Database in progress)	IEP	SWAMP	USBR
Geographic Coverage	California counties	California counties	California counties	51 US Basins California Basins: Sacramento Basin, San Joaquin-Tulare Basin, Santa Ana Basin	California Basins	California Bay Delta Tributaries	California surface-water systems	California dams, canals and aqueducts
Temporal Coverage	1901-1999	1999-2007	1900's-2007	Assesments: 1-Sacramento River Basin 1994-98 San Joaquin-Tulare Basin 1991-95 3-Santa Ana Basin 1997-2001	2004-2010	Water Quality data:1983-2007	1959-2007	1980-2007
Database download format	.tar.gz files, .txt, .pdf, .jpeg, .gif, and html files	.tar.gz files, .txt, .pdf, .jpeg, .gif, and html files	HTML, tab separated (wide order, serial order) (saved, compressed), Graphs, formatted tables and WATSTORE standard format	count, serial, crostab-basic, crostab-extended	GIS covers: e00.gz	Delta Simulation Modeling 2 (DSM2) work team modules.	tab delimited format, excel spreadsheet	Real Time, tables, graphs and tab-separated
System requirements for download	Decompression software (e.g., WINZIP) Excel	Decompression software (e.g. WINZIP) Excel	Decompression software (i.e. WINZIP) Excel		not available		Excel, database or statistical applications	
Database Size	1.5 million records for CA. Only a maximum of 600,000 records at a time are allowed for each download	1.5 million records for CA. Only a maximum of 600,000 records at a time are allowed for each download			not available	Water-quality database 184MB		
Data Owner	Multiple agencies	Multiple agencies	USGS	USGS	USGS	USGS, USBR, DWR, USEPA, NMFS, DFG, SWRCB, USFWS, USACE	Multiple agencies	USBR
Data retrieval	<a href="http://www.epa.gov/storet/dbtop">http://www.epa.gov/storet/dbtop</a>	<a href="http://www.epa.gov/storet/dbtop">http://www.epa.gov/storet/dbtop</a>	<a href="http://waterdata.usgs.gov/nwis">http://waterdata.usgs.gov/nwis</a>	<a href="http://water.usgs.gov/nawqa">http://water.usgs.gov/nawqa</a>	<a href="http://www.ca.water.usgs.gov/gama">http://www.ca.water.usgs.gov/gama</a>	<a href="http://www.iep.ca.gov">http://www.iep.ca.gov</a>	Bay Delta and Tributaries project <a href="http://bdat.ca.gov">http://bdat.ca.gov</a>	<a href="http://www.usbr.gov">http://www.usbr.gov</a>
Online query structure	Query by hydrologic unit, state, county, station, beginning date/ending date and parameters.	Query by state, county, station type (stream, well, lake), medium and parameters	Query by data category of interest, by state, by hydrologic unit or specific site	Query by site, ground water, surface water, state, county, land use and parameters.	not available	Query of water daily outflow by year. Water quality data index.	Query by data category (toxicity, water quality, soil) date range, analytes, projects, stations or methods.	Precipitation data at <a href="http://cdec.water.ca.gov">cdec.water.ca.gov</a> . Query by project at <a href="http://bdat.ca.gov">bdat.ca.gov</a> . Water deliveries and diversions at <a href="http://usbr.gov/mp/cvo/deliv.html">usbr.gov/mp/cvo/deliv.html</a>
List of parameters	A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.		A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.
Comments on Quality	Quality assurance must be obtained directly with the data provider.	Quality assurance must be obtained directly with the data provider.	QA/QC available for data from 1973 to 1995. For project specific reports must contact the district's office.	Most of the NAWQA data comes from NWIS.	Data not available at this time	Quality must be obtained directly with the data provider.	Data verification and screening provided by the Moss Landing Data Management Team(DMT.) Analyzing labs submit QA/QC data to the DMT.	USBR publishes data collected by standard and accepted methods or best available methods.

Agency	Department of Pesticide Regulation	California Department of Water Resources	California Irrigation Management Information System (DWR)	California Department of Water Resources	California Department of Water Resources	Department of Health Services
Database	DPR	DWR Water Data Library	CIMIS	CDEC	BDAT	DHS
Contact Person	Keith Starner (Environmental Research Scientist)	Eric Senter Greg Smith Brian Niski	Bekele Temesgen Kent Frame	Rodney Mayer (Acting Division Chief)	Karl Jacobs ( BDAT Senior Project Manager)	David Lancaster
Contact number	(916) 324-4167	Eric Senter (916) 651-9648 Greg Smith (916) 653-6410 Brian Niski (916) 651-9289	B. Temesgen (916) 651-9679 K Frame (916) 651-7030	(916) 574-0601	(916) 651-9581	(916) 445-4218
E-mail	kstarner@cdpr.ca.gov	esenter@water.ca.gov gregs@water.ca.gov bniski@water.ca.gov	temesgen@water.ca.gov kframe@water.ca.gov	webmaster@flood.water.ca.gov	kjacobs@water.ca.gov	dlancast@dhs.ca.gov
Surface water	Pesticides and pesticides degradates in California rivers, creeks, urban streams, Bay delta and storm-water runoff	System stage and flow. Water-quality data (physical and chemical parameters)	N/A	river conditions, river stage, flow, reservoir data, precipitation	Water-quality data (physical and chemical parameters) toxicity	N/A
Ground water	N/A	Groundwater elevation and temperature. Water-quality data (physical and chemical parameters)	N/A	N/A	N/A	N/A
Drinking water	N/A	N/A	N/A	N/A	DHS project with water quality data	Concentrations of EPA's Maximum Contaminant Levels for drinking water in CA
Waste water	N/A	N/A	N/A	N/A	N/A	N/A
Water import/export	N/A	Surface water flow	N/A	water deliveries, precipitation, snow, river discharge	water flow, velocity, discharge	N/A
Salinity	TDS content at sampled sites	TDS content at sampled site Water quality at diversion stations	Hourly, daily and monthly evapotranspiration and precipitation data.	link to water delivery projects, DWR and USBR	TDS and salinity data	N/A
Geological setting	N/A	N/A	Site description, elevation	N/A	N/A	N/A

Agency	Department of Pesticide Regulation	California Department of Water Resources	California Irrigation Management Information System (DWR)	California Department of Water Resources	California Department of Water Resources	Department of Health Services
Database	DPR	DWR Water Data Library	CIMIS	CDEC	BDAT	DHS
Geographic Coverage	California counties	California ground-water information by basins and township. Surface water by stream name.	120 automated weather stations in the state of California	California rivers and reservoirs, snowpack in CA river basins	Bay Delta and tributaries	California counties and irrigation districts regulated by DHS
Temporal Coverage	1990-2005	1980-2007	1982-2007	1932-2007	1959-2007	DHS project data available online (1980-1991)
Database download format	Fixed column width format	HTML, HTML crosstab, excel, excel crosstab, text, text crosstab	web format, CSV format, XML format, PDF format	CSV, web format, comma separated file	tab delimited format, excel spreadsheet	Data is available by request as reports and excel files.
System requirements for download	spreadsheet software	spreadsheet software		spreadsheet software		spreadsheet software
Database Size	Five downloadable files surface water data 41.18mb sediment data 457kb		CIMIS has restrictions on the data downloaded at one time. The data file size is expressed as points with each data value being a point.			
Data Owner	DPR	DWR	DWR and other water agencies, universities, cities, U.S.D.A, U.S.B.R., conservation districts, and private agricultural related industries.	Various agencies: NWS, USBR, USACE, PG&E, SMUD, USGS		DHS
Data retrieval	Online download @ cdpr.ca.gov	Water-quality data at wdl.water.ca.gov. DWR Environmental Monitoring Program water quality data at iep.ca.gov.	<a href="http://www.cimis.water.ca.gov/cimis/data.jsp">http://www.cimis.water.ca.gov/cimis/data.jsp</a>	surface water Real-time data at cdec.water.ca.gov.	Water quality data at bdat.ca.gov	By request: drinking water regulations and regulations to the irrigation districts in CA. Online download of DHS drinking water project data at bdat.ca.gov
Online query structure	Query of surface water chemical analyses by county	Query by station ID, project, site and station map.	Query by station and date	Real-time data query by station, date and time	Query by project, category, location and agency	Query by data category (water quality), DHS project, analytes, date range, stations and methods
List of parameters		A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.	A detailed list of parameters is available.
Comments on Quality	Metadata files for the surface water studies conducted by the DPR. They described the metadata for each agency that provided data for the projects.	Analyses follow: EPA or Standards Methods specifications. Lab QC data (1998-2007) available upon request.	Data are quality tested and flagged if it is missing or if they fall outside a set standard. Quality control program printout is checked daily to detect potential station malfunction.	Data falling out of limits is flagged. Data is provisional and should not be considered data of record and is not an official source of historic climate data.	Quality assurance data must be obtained directly with the data provider. Projects submitted to BDAT have metadata files.	Data refers to state regulations based on MCL's established by the EPA. Quality assurance and control available through DHS

	Database												
Parameters by group	STORET	NWIS	NAWQA	GAMA	IEP	SWAMP	USBR	DPR	DWR	CIMIS	CDEC	BDAT	DHS
Agency	X	X							X		X		X
Station name	X	X							X	X	X		X
sample coordinates	X	X	X		X	X		X	X		X	X	X
region/county	X	X	X		X	X	X	X	X		X	X	X
sample date	X	X	X		X	X	X	X	X	X	X	X	X
sample time	X	X	X			X	X		X	X	X	X	X
sample type	X	X											X
analyzing lab	X								X				X
inorganics	X	X	X	X		X			X			X	X
radionuclides	X	X		X		X						X	X
VOC	X	X	X	X		X		X	X			X	X
SOC	X	X	X	X		X						X	X
disinfection byproducts	X												X
treatment techniques	X	X											X
nutrients	X	X	X	X		X			X			X	X
biological	X	X	X	X	X	X			X			X	
minor and trace organics	X	X	X	X		X			X			X	
organics	X	X	X	X		X			X			X	X
radiochemicals	X	X											
sediment	X	X	X			X		X				X	
isotopes	X	X		X									
physical	X	X	X	X	X	X	X	X	X	X	X	X	X
DOC	X	X	X	X		X						X	
pharmaceutical products		X	X	X									
disinfection byproducts	X	X	X	X		X		X	X			X	X
pesticide degradates	X	X	X	X		X			X			X	
waste water indicators	X	X	X	X		X						X	
land use	X		X										
soil	X		X			X						X	
population density (human)	X		X										
hydrophobic compounds	X		X										
precipitation										X	X		
Evapotranspiration										X			
TDS					X	X		X	X			X	



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## **APPENDIX 2**

### **Descriptions of Data Sources**

## **Ground Water**

### **Environmental Protection Agency**

Database: STOrage and RETrieval (**STORET**)

STORET database has two major data sets: STORET Legacy Data Set (LDC) and the Modernized STORET data set. The LCD data set contains data from 1901 to 1999 and data of undocumented quality. The Modernized data set contains data from 1999 to 2007. Both systems contain raw biological, physical and chemical data on surface and ground water. Data published on these data sets is provided and collected by federal, state, local agencies, Indian tribes, volunteer groups, and academics. Retrieved data queries from both data sets include quality control, and personnel responsible for the data. However, data quality assurance is not published by STORET and must be obtained from the original data provider.

#### **Ground-Water Data**

- Water quality data for wells
- Physical water quality parameters (e.g., pH, temperature, and conductivity.)
- Chemical water quality parameters (e.g., nutrients, disinfection byproducts, pesticides, and isotopes.)
- Site identification
- Sampling methods
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

### **United States Geological Survey**

Database: National Water Information System (**NWIS**)

The USGS' NWIS database contains records of data collected from 1900's to 2007. NWIS data is organized in 4 categories: Real-time data, site information, surface water, ground water and water quality. The database has quality assurance reports available for data from 1973 to 1995. QA/QC reports for specific projects available at the district's office.

#### **Ground-Water Data**

- Ground-water level measurements
- Physical water quality parameters (e.g., pH, temperature, and conductivity)

- Chemical water quality parameters (e.g., nutrients, organics, inorganics, radiochemicals.)
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

#### Database: National Water Quality Assessment Program (**NAWQA**)

NAWQA is a database created since 1999 to facilitate national and regional analysis of data from several study units in the US. Three study units in California can be accessed through this database (1) the Sacramento River Basin, (2) the San Joaquin-Tulare Basin and (3) the Santa Ana Basin. Data records for these basins include chemical, biological, and physical water-quality data. NAWQA is relatively new database which shares most of the water quality data with the NWIS database.

#### Ground-Water Data

- Ground-water levels for sampled wells
- Physical water quality parameters (e.g., pH, temperature, and conductivity)
- Chemical water quality parameters (e.g., nutrients, organics, inorganics, radio-chemicals.)
- Sample latitude and longitude as well as correspondent state, county, hydrologic unit code and land use
- Site, well, and basin information associated with thousands of descriptive variables derived from spatial analysis such as land use, soil, and population density.

#### Database: Ground-Water Ambient Monitoring and Assessment Program (**GAMA**)

The USGS GAMA does not have a published database at this time because it is an in progress project. However, they do have water quality publications available through the USGS Publications warehouse (<http://infotrek.er.usgs.gov/pubs>). GAMA database will cover ground-water data collected from 2004 to 2010.

#### Ground-Water Data

- Chemical water quality parameters (e.g., nutrients, organics, inorganics, radiochemicals.)
- Pesticides
- GIS files with hydro-geologic provinces, based upon California's ground-water basins
- Sampled wells identified in GIS within the California basins

## **Department of Water Resources**

DWR water data can be found in 4 databases, California Data Exchange Center (CDEC), California Irrigation Management Information System (CIMIS), Water Data Library, and the Bay Delta Tributaries. All 4 databases contain water related data, but only the Water Data Library database contains ground-water data. Data quality assurance is provided by DWR. Laboratory analyses follow the EPA or Standards Methods specifications. A detailed laboratory QC data from 1998 to 2007 is available to the public upon request.

### **Database: Water Data Library**

Water data library provides on-line access to hydrologic data collected by the Division of Planning and Local Assistance and other organizations within the Department of Water Resources. Water quality data can be searched by wells and basins.

#### **Ground-Water Data**

- Ground-water level measurements
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code
- Contour data by basins.

## **Surface Water**

## **Environmental Protection Agency**

### **Database: STOrage and RETrieval (STORET)**

STORET database has two major data sets: STORET Legacy Data Set (LDC) and the Modernized STORET data set. The LCD data set contains data from 1901 to 1999 and data of undocumented quality. The Modernized data set contains data from 1999 to 2007. Both systems contain raw biological, physical and chemical data on surface and ground water. Data published on these data sets is provided and collected by federal, state, local agencies, Indian tribes, volunteer groups, and academics. Retrieved data queries from both data sets include quality control, and personnel responsible for the data. However, data quality assurance is not published by STORET and must be obtained from the original data provider.

#### Surface Water Data

- Water quality data for rivers, streams, reservoirs, lakes and canals.
- Physical water quality parameters (e.g., pH, temperature, and conductivity, stage, storage, stream flow)
- Chemical water quality parameters (e.g., nutrients, disinfection byproducts, pesticides, and isotopes.)
- Site identification
- Sampling methods
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

### **United States Geological Survey**

#### Database: National Water Information System (NWIS)

The USGS' NWIS database contains records of data collected from 1900's to 2007. NWIS data is organized in 4 categories: Real-time data, site information, surface water, ground water and water quality. The database has quality assurance reports available for data from 1973 to 1995. QA/QC reports for specific projects available at the district's office.

#### Surface Water Data

- Records of stream flow, current hydrologic conditions and peak flow data (daily, annual and 15-60 minute intervals)
- Physical water quality parameters (e.g., pH, temperature, conductivity, stage, storage.)
- Chemical water quality parameters (e.g., nutrients, organics, inorganics, radio-chemicals.)
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

#### Database: National Water Quality Assessment Program (NAWQA)

NAWQA is a database created since 1999 to facilitate national and regional analysis of data from several study units in the US. Three study units in California can be accessed through this database (1) the Sacramento River Basin, (2) the San Joaquin-Tulare Basin and (3) the Santa Ana Basin. Data records for these basins include chemical, biological, and physical water-quality data. NAWQA is relatively new database which shares most of the water quality data with the NWIS database.

#### Surface Water Data

- Chemical water quality parameters in water, sediment, and aquatic-organisms tissue
- Quality-control data from the USGS National Water Information System (NWIS)
- Daily river stream-flow and temperature information from NWIS for selected sampling sites.
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.

#### **Interagency Ecological Program**

The Interagency Ecological Program (IEP) shares data provided from state and federal agencies. The agencies involved in the program are: U.S. Geological Survey (USGS), U.S. Bureau of Reclamation (USBR), Department of Water Resources (DWR), U.S. Environmental Protection Agency (EPA), NOAA's National Marine Fisheries (NMFS), Department of Fish and Game (DFG), State Water Resources Control Board (SWRCB), U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (USACE). Data obtained from the IEP database does not contain QA/QC information. Quality assurance must be obtained directly for the data provider.

#### Database: **Dayflow**

Dayflow output is used extensively in studies initiated by the Department of Water Resources (DWR), the Department of Fish and Game (DFG), and less frequently by other State and Federal agencies [e.g., U. S. Bureau of Reclamation (USBR)] and private consultants. The database includes data from 1983-2007.

#### Surface Water Data

- Physical water quality parameters (stage, flow, pH)
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code.
- Estimates of historical mean daily flows in the Bay Delta area
  - through the Delta Cross Channel and Georgiana Slough
  - Past Jersey Pint
  - Past Chipps Island to San Francisco Bay (net Delta outflow)

#### **State Water Resources Control Board**

#### Database: Surface Water Ambient Monitoring Program (**SWAMP**)

SWAMP database was designed to transfer data into larger data exchange networks. Water quality, toxicity, sediment chemistry, microbiological, habitat, biological, fish and shellfish tissue data and metadata are managed within a

central database that is fed from peripheral databases. The database has both a temporary and permanent side for data storage. Only regional board staff (RBS) have access to the data on the temporary side. These data are screened and verified using tools developed by the Data Management Team (DMT) at Moss Landing. Once the verification is complete the data are transferred to the permanent side of the database where it is accessible to the public through Web interfaces from the California Environmental Data Exchange Network CEDEN: <http://bdat.ca.gov/>. SWAMP data are created in the field and laboratory. The laboratories analyze the samples collected by the field crews and submit the analytical and quality assurance/quality control (QA/QC) data in standard formats to the DMT for loading into the database using automated loading programs. The field crews and laboratories provide the initial verification of their respective data.

#### Surface Water Data

- Physical and chemical water quality parameters for the California surface water systems.
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code
- Toxicity

### **U.S Bureau of Reclamation**

Database: **USBR**

USBR is the largest wholesaler of water in the country. It brings water to more than 31 million people, and provides one out of five Western farmers (140,000) with irrigation water for 10 million acres of farmland that produce 60% of the nation's vegetables and 25% of its' fruits and nuts. USBR contains information related to the California Dams, canals and aqueducts. The information disseminated by the USBR is developed under strict scientific standards that ensure its quality and integrity.

#### Surface Water Data

- Daily, annual, and monthly precipitation data recorded since 1980.
- Sample's correspondent state and county
- Stream flow
- Snow-pack formation
- Water supply to irrigated areas
- Water capacity in the California dams

### **Department of Pesticide Regulation**

Database: **Surface Water**

The Surface Water Database contains data from a wide variety of environmental monitoring studies designed to test for the presence or absence of pesticides in California surface waters. The data are monitoring results for pesticides in samples taken from rivers, creeks, urban streams, and agricultural drains in California, the San Francisco Bay delta region, and urban storm-water runoff. Metadata files describing the QA/QC of the data are available for the surface water studies conducted by the DPR. They described the metadata for each agency that provided data for the projects.

#### Surface Water Data

- Pesticides concentrations in samples from rivers, creeks and streams in California
- Sample latitude and longitude as well as correspondent state and county

### **Department of Water Resources**

DWR water data can be found in 4 databases, California Data Exchange Center (CDEC), California Irrigation Management Information System (CIMIS), Water Data Library, and the Bay Delta Tributaries. All 4 databases contain surface water data. Quality of the data is provided by DWR. Laboratory analyses follow the EPA or Standards Methods specifications. A detailed laboratory QC data from 1998 to 2007 is available to the public upon request.

#### Database: California Data Exchange Center (**CDEC**)

Real-time decision support system to DWR Flood Management and other flood emergency response organizations, providing operational and historical hydrologic and meteorological data

#### Surface Water Data

- Current river conditions
- Snow pack status
- River stages
- Reservoir data
- Satellite images
- Measuring stations description and location
- River weather forecast

#### Database: California Irrigation Management Information System (**CIMIS**)

CIMIS is an integrated network of over 125 automated active weather stations located throughout California. CIMIS weather stations collect weather data on a minute-by-minute basis.



#### Surface Water Data

- Weather data affecting surface waters such as evapotranspiration (ET), net radiation (Rn), dew point temperature, as solar radiation (Rs), air temperature (T), relative humidity (RH), wind speed (u), etc.

#### Database: **Water Data Library**

Water data library provides on-line access to hydrologic data collected by the Division of Planning and Local Assistance and other organizations within the Department of Water Resources. Water quality data can be searched by wells and basins.

#### Surface Water Data

- Flow, 15 minute data
- Daily flow (minimum-maximum cfs)
- Stage 15 minute data (ft)
- Daily stage mean (ft)
- Daily stage (minimum-maximum ft)

#### Database: Bay Delta Tributaries (**BDAT**)

BDAT is a database part of the California Environmental Data Exchange Network (CEDEN), which includes projects and organizations from all parts of the state. BDAT contains environmental data concerning the San Francisco Bay-Delta and provides public access to that data. The database includes biological, water quality, and meteorological data.

#### Surface Water Data

- Physical and chemical water quality data for the rivers and lakes in the Central Valley and the Bay delta.
- Sample latitude and longitude as well as correspondent state, county and hydrologic unit code

### **Drinking Water**

#### **Environmental Protection Agency**

#### Database: STorage and RETrieval (**STORET**)

STORET database has two major data sets: STORET Legacy Data Set (LDC) and the Modernized STORET data set. The LCD data set contains data from 1901 to 1999 and data of undocumented quality. The Modernized data set contains data from 1999 to 2007. Both systems contain raw biological, physical and chemical data on surface and ground water. Data published on these data sets is provided and collected by federal, state, local agencies, Indian tribes, volunteer groups, and academics. Retrieved data queries from both data sets include quality control, and personnel responsible for the data. However, data quality assurance is not published by STORET and must be obtained from the original data provider.

#### Drinking Water Data

- Water quality of public water supply systems

### **Department of Health Services**

Database: Non-internet Water Quality Reports

The Department of Health Service contains water quality reports for drinking water for the irrigation districts and the public water systems they regulate. Water quality data is available as print-out reports and as excel files.

#### Drinking Water Data

- Maximum contaminant levels fro drinking water in California

### **Waste Water**

### **Environmental Protection Agency**

Database: STOrage and RETrieval (**STORET**)

STORET database has two major data sets: STORET Legacy Data Set (LDC) and the Modernized STORET data set. The LCD data set contains data from 1901 to 1999 and data of undocumented quality. The Modernized data set contains data from 1999 to 2007. Both systems contain raw biological, physical and chemical data on surface and ground water. Data published on these data sets is provided and collected by federal, state, local agencies, Indian tribes, volunteer groups, and academics. Retrieved data queries from both data sets include quality control, and personnel responsible for the data. However, data quality assurance is not published by STORET and must be obtained from the original data provider.

#### Waste-Water Data

- Waste water indicators

- Chemical parameters in waste water
- Flow in waste water treatment plant

## **Salinity**

### **Environmental Protection Agency**

Database: STOrage and RETrieval (**STORET**)

STORET database has two major data sets: STORET Legacy Data Set (LDC) and the Modernized STORET data set. The LCD data set contains data from 1901 to 1999 and data of undocumented quality. The Modernized data set contains data from 1999 to 2007. Both systems contain raw biological, physical and chemical data on surface and ground water. Data published on these data sets is provided and collected by federal, state, local agencies, Indian tribes, volunteer groups, and academics. Retrieved data queries from both data sets include quality control, and personnel responsible for the data. However, data quality assurance is not published by STORET and must be obtained from the original data provider.

Salinity Data

- Water conductance and nutrients (e.g., phosphate, nitrate)

### **United States Geological Survey**

Database: National Water Information System (**NWIS**)

The USGS' NWIS database contains records of data collected from 1900's to 2007. NWIS data is organized in 4 categories: Real-time data, site information, surface water, ground water and water quality. The database has quality assurance reports available for data from 1973 to 1995. QA/QC reports for specific projects available at the district's office.

Salinity Data

- Water conductance and nutrients (e.g., phosphate, nitrate)
- Daily stream flow and discharge

Database: National Water Quality Assessment Program (**NAWQA**)

NAWQA is a database created since 1999 to facilitate national and regional analysis of data from several study units in the US. Three study units in

California can be accessed through this database (1) the Sacramento River Basin, (2) the San Joaquin-Tulare Basin and (3) the Santa Ana Basin. Data records for these basins include chemical, biological, and physical water-quality data. NAWQA is relatively new database which shares most of the water quality data with the NWIS database.

#### Salinity Data

- Water conductance and nutrients (e.g., phosphate, nitrate)
- Daily stream flow and discharge

#### Database: Ground-Water Ambient Monitoring and Assessment Program (GAMA)

The USGS GAMA does not have a published database at this time because it is an in progress project. However, they do have water quality publications available through the USGS Publications warehouse (<http://infotrek.er.usgs.gov/pubs>). GAMA database will cover ground-water data collected from 2004 to 2010.

#### Salinity Data:

- TDS content in ground-water samples

#### **Interagency Ecological Program**

The Interagency Ecological Program (IEP) shares data provided from state and federal agencies. The agencies involved in the program are: U.S. Geological Survey (USGS), U.S. Bureau of Reclamation (USBR), Department of Water Resources (DWR), U.S. Environmental Protection Agency (EPA), NOAA's National Marine Fisheries (NMFS), Department of Fish and Game (DFG), State Water Resources Control Board (SWRCB), U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (USACE). Data obtained from the IEP database does not contain QA/QC information. Quality assurance must be obtained directly for the data provider.

#### Database: **Dayflow**

Dayflow output is used extensively in studies initiated by the Department of Water Resources (DWR), the Department of Fish and Game (DFG), and less frequently by other State and Federal agencies [e.g., U. S. Bureau of Reclamation (USBR)] and private consultants. The database includes data from 1983-2007.

#### Salinity Data

- Water conductance
- TDS content in sample sites
- Estimates of historical mean daily flows in the Bay Delta area
  - through the Delta Cross Channel and Georgiana Slough
  - Past Jersey Pint
  - Past Chipps Island to San Francisco Bay (net Delta outflow)

## **State Water Resources Control Board**

Database: Surface Water Ambient Monitoring Program (**SWAMP**)

SWAMP database was designed to transfer data into larger data exchange networks. Water quality, toxicity, sediment chemistry, microbiological, habitat, biological, fish and shellfish tissue data and metadata are managed within a central database that is fed from peripheral databases. The database has both a temporary and permanent side for data storage. Only regional board staff (RBS) have access to the data on the temporary side. These data are screened and verified using tools developed by the Data Management Team (DMT) at Moss Landing. Once the verification is complete the data are transferred to the permanent side of the database where it is accessible to the public through Web interfaces from the California Environmental Data Exchange Network CEDEN: <http://bdat.ca.gov/>. SWAMP data are created in the field and laboratory. The laboratories analyze the samples collected by the field crews and submit the analytical and quality assurance/quality control (QA/QC) data in standard formats to the DMT for loading into the database using automated loading programs. The field crews and laboratories provide the initial verification of their respective data.

Salinity Data

- Water conductance and nutrients (e.g., phosphate, nitrate)
- TDS content at sampled sites

## **U.S Bureau of Reclamation**

Database: **USBR**

USBR is the largest wholesaler of water in the country. It brings water to more than 31 million people, and provides one out of five Western farmers (140,000) with irrigation water for 10 million acres of farmland that produce 60% of the nation's vegetables and 25% of its' fruits and nuts. USBR contains information related to the California Dams, canals and aqueducts. The information disseminated by the USBR is developed under strict scientific standards that ensure its quality and integrity.

Salinity Data

- Stream flow
- Snow-pack formation
- Water supply to irrigated areas
- Water capacity in the California dams
- Records on water deliveries and diversion

## **Department of Pesticide Regulation**

Database: **Surface Water**

The Surface Water Database contains data from a wide variety of environmental monitoring studies designed to test for the presence or absence of pesticides in California surface waters. The data are monitoring results for pesticides in samples taken from rivers, creeks, urban streams, and agricultural drains in California, the San Francisco Bay delta region, and urban storm-water runoff. Metadata files describing the QA/QC of the data are available for the surface water studies conducted by the DPR. They described the metadata for each agency that provided data for the projects.

Salinity Data

- TDS content at sampled sites